

<b>Notice of Allowability</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/728,496	SAHA ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	BERNARD KRASNIC	2624	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 2/24/2010.
2. ☒ The allowed claim(s) is/are 1, 3-4, 8-11, 13-14, 16-17, 19, 22, 25, 27, 31, and 33-37 now renumbered as 1-21.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
  - \* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. <input type="checkbox"/> Notice of References Cited (PTO-892)</li> <li>2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)</li> <li>3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br/>Paper No./Mail Date _____</li> <li>4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br/>of Biological Material</li> </ol> | <ol style="list-style-type: none"> <li>5. <input type="checkbox"/> Notice of Informal Patent Application</li> <li>6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),<br/>Paper No./Mail Date <u>20100310</u> .</li> <li>7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment</li> <li>8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance</li> <li>9. <input type="checkbox"/> Other _____.</li> </ol> |
|---|---|

/Bernard Krasnic/  
Examiner, Art Unit 2624



### DETAILED ACTION

1. This Office Action incorporates an Examiner's Amendment and Reasons For Allowance.
2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/24/2010 has been entered.
3. The Applicant has canceled claim(s) 2, 5-7, 12, 18, 20, 21, 26, 28 and 32.
4. The application has pending claim(s) 1, 3-4, 8-11, 13-17, 19, 22-25, 27, 31, and 33-34.
5. In response to the Request for Continued Examination filed on 2/24/2010:  
  
The "Objections to the drawings and claims" have been entered and therefore the Examiner withdraws the objections to the drawings and claims.

6. The Declaration filed on 2/24/2010 under 37 CFR 1.131 is sufficient to overcome the Borgefors ("Fuzzy border distance transforms and their use in 2D skeletonization" – August 2002, as applied in previous Office Action) reference.

7. Applicant's arguments, see "Response to Examiner's Claim Rejections under 35 U.S.C. 102 and 103 ..." in pages 7-9, filed 2/24/2010, with respect to pending claim(s) 1, 3-4, 8-11, 13-17, 19, 22-25, 27, 31, and 33-34 have been fully considered and are persuasive. The 35 U.S.C. 102(a) and 35 U.S.C. 103(a) rejections of claim(s) 1, 3-4, 8-11, 13-17, 19, 22-25, 27, 31, and 33-34 has been withdrawn.

#### **EXAMINER'S AMENDMENT**

8. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Ms. Evelyn McConathy (Reg. No. 35, 279) on March 10, 2010.

#### The application has been amended as follows:

For the claims on pages 4-6 of the Applicant's Request for Continued Examination dated 2/24/2010:

1. Please further amend claims 1, 14, 15, 17, 19, 22-24, 27, 33 and 35-37 as shown by the attached pages.

Claim 1. (Currently Amended) A fuzzy distance transform-based computational method for analyzing digital images defining a volumetric region of an object from an image comprising:

- (a) obtaining an image of the targeted object, comprising bone, bone marrow space, cortical bone, blood vessels ~~or lung airways~~ or combinations thereof;
- (b) finding a plurality of points in the image to generate a fuzzy subset and computing a fuzzy distance transform (FDT) of the fuzzy subset, comprising sampling FDT values along a medial axis of a support of the fuzzy subset to estimate regional target object thickness distribution and assigning to a point in the fuzzy subset, its respective fuzzy distance from a complement of a support of the fuzzy subset;
- (c) compiling a computer processed plot or revised image based upon the computed FDT; and
- (d) displaying same in high resolution.

Claim 14. (Currently Amended) The method of ~~claim 1~~ claim 9, wherein the targeted object is in or from an animal or human subject.

Claim 15. Cancelled.

Claim 17. (Currently Amended) A fuzzy distance transform-based computational method for ~~evaluating or diagnosing bone disease in a subject by~~ analyzing digital

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images defining at least one volumetric region of bone from or in the subject, the method comprising:

- (a) obtaining an image of targeted bone region;
- (b) finding a plurality of points in the image to generate a fuzzy subset and computing a fuzzy distance transform (FDT) of the fuzzy subset, comprising sampling FDT values along a medial axis of a support of the fuzzy subset to estimate regional target object thickness distribution and assigning to a point in the fuzzy subset its respective fuzzy distance from a complement of a support of the fuzzy subset;
- (c) compiling a computer processed plot or revised image based upon the computed FDT; and
- (d) displaying same in high resolution.

Claim 19. (Currently Amended) The method of ~~claim 18~~ claim 17, wherein the support comprises a set of all points in the fuzzy subset with a value greater than or equal to a support value.

Claim 22. (Currently Amended) The method of claim 17, further comprising diagnosing or evaluating ~~selecting a therapy based on the diagnosis or evaluation of~~ bone disease in the subject.

Claims 23-24. Cancelled.

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Claim 27. (Currently Amended) The method of ~~claim 26~~ claim 25, wherein the support comprises a set of all points in the fuzzy subset with a value greater than or equal to a support value.

Claim 33. (Currently Amended) The method of ~~claim 32~~ claim 31, wherein the support comprises a set of all points in the fuzzy subset with a value greater than or equal to a support value.

Claim 35. (New) The method of claim 22, further comprising selecting a therapy based on the diagnosis or evaluation of bone disease in the subject.

Claim 36. (New) The method of claim 35, further comprising administering the therapy to the subject.

Claim 37. (New) The method of claim 36, wherein the evaluation further comprises monitoring a progression or regression of bone disease in the subject, during or at one or more times after administering the selected therapy.

### **REASONS FOR ALLOWANCE**

9. The following is an examiner's statement of reasons for allowance:

Claims 1, 3-4, 8-11, 13-14, 16-17, 19, 22, 25, 27, 31, and 33-37 (now renumbered as 1-21, for issue) are allowed.

Independent claim 1 (now renumbered as claim 1, for issue) respectively recites the limitations of: (a) obtaining an image of the targeted object, comprising bone, bone marrow space, cortical bone, blood vessels or combinations thereof; (b) finding a plurality of points in the image to generate a fuzzy subset and computing a fuzzy distance transform (FDT) of the fuzzy subset, comprising sampling FDT values along a medial axis of a support of the fuzzy subset to estimate regional target object thickness distribution and assigning to a point in the fuzzy subset, its respective fuzzy distance from a complement of a support of the fuzzy subset.

Independent claim 17 (now renumbered as claim 13, for issue) respectively recites the limitations of: (a) obtaining an image of targeted bone region; (b) finding a plurality of points in the image to generate a fuzzy subset and computing a fuzzy distance transform (FDT) of the fuzzy subset, comprising sampling FDT values along a medial axis of a support of the fuzzy subset to estimate regional target object thickness distribution and assigning to a point in the fuzzy subset its respective fuzzy distance from a complement of a support of the fuzzy subset.

The combination of these features as cited in the claims in combination with the other limitations of the claims are neither disclosed nor suggested by the prior art of record.



The closest reference Wang ("Some Sequential Algorithms for a Generalized Distance Transformation Based on Minkowski Operations" – IEEE – 1992, pages 1114-1121, as applied in previous Office Action) discloses assigning a point in the subset its respective distance from a complement of a support of the subset. However, Wang does not teach the limitations cited above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Krasnic whose telephone number is (571) 270-1357. The examiner can normally be reached on Mon-Thur 8:00am-4:00pm and every other Friday 8:00am-3:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bhavesh M Mehta/

Supervisory Patent Examiner, Art Unit 2624

/Bernard Krasnic/

March 10, 2010